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Attorney Docket No. 3600.100 Cont.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Reissue Application of	)	Examiner: C. Verdier
DAVID A. SPEAR ET AL.	)	Group Art Unit: 3745
Appln. No.: 09/874,931	)	
Filed: June 5, 2001	)	
For: SWEPT TURBOMACHINERY BLADE	)	Application to reissue U.S. Patent No. 5,642,985

Assistant Commissioner for Patents
Box REISSUE
Washington, D.C. 20231

REISSUE DECLARATION AND POWER OF ATTORNEY

Sir:

We, DAVID A. SPEAR, who was a United States citizen residing at Manchester, Connecticut, at the time of his death on October 22, 1995, BRUCE P. BIEDERMAN, a United States citizen residing at Meriden, Connecticut, and JOHN A. OROSA, a United States citizen residing at Palm Beach Gardens, Florida, hereby declare and say that:

1. We believe that we are the original, first and joint inventors of the subject matter which is claimed in the subject reissue application and for which a reissue patent is sought on the invention entitled SWEPT TURBOMACHINERY BLADE.

2. We have reviewed and understand the contents of the reissue application, including the claims.

3. We acknowledge our duty to disclose to the U.S. Patent and Trademark Office all information known to be material to patentability as defined in 37 C.F.R. § 1.56.

4. We believe that the original above-identified U.S. Patent No. 5,642,985 is partly inoperative by reason of us having claimed less than we had the right to claim in that patent. Specifically, we believe that we were entitled to claims to at least the following subject matter:

> A fan stage of a ducted gas turbine engine that is at least in part rotatable about an axis of rotation, comprising:
>
> a fan casing that defines an inner duct wall having a fan rotor region, the inner duct wall of the fan casing at the fan rotor region being convergent;
>
> a hub disposed concentrically relative to the fan casing;
>
> a fan rotor that includes multiple swept fan blades, the swept fan blades being spaced apart around the hub, each of the multiple swept fan blades having:
>
> a tip profile that substantially corresponds to the convergent inner duct wall of the fan casing;
>
> a leading edge that defines a variable sweep angle in a direction perpendicular to the axis of rotation, the leading edge including:
>
> an inner region adjacent the hub, the inner region defining a forward sweep angle;
>
> an intermediate region between the inner region and the fan casing, the intermediate region defining a rearward sweep angle; and
>
> an outer region between the intermediate region and the fan casing, the outer region being translated forward.

A fan stage of a ducted gas turbine engine that is at least in part rotatable about an axis of rotation, comprising:

a fan casing that defines an inner duct wall having a fan rotor region, the inner duct wall of the fan casing at the fan rotor region being convergent;

a hub disposed concentrically relative to the fan casing;

a fan rotor that includes multiple swept fan blades, the swept fan blades being spaced apart around the hub, each of the multiple swept fan blades having:

a tip profile that is convergent so as to substantially correspond to the convergent inner duct wall of the fan casing;

a leading edge that defines a variable sweep angle in a direction perpendicular to the axis of rotation, the leading edge including:

an inner region adjacent the hub, the inner region defining a forward sweep angle;

an intermediate region between the inner region and the fan casing, the intermediate region defining a rearward sweep angle; and

an outer region between the intermediate region and the fan casing, the outer region being translated forward.

A fan stage of a ducted gas turbine engine that is at least in part rotatable about an axis of rotation, comprising:

a fan casing that defines an inner duct wall having a fan rotor region, the inner duct wall of the fan casing at the fan rotor region being convergent;

a hub disposed concentrically relative to the fan casing;

a fan rotor that includes multiple swept fan blades, the swept fan blades being spaced apart around the hub, each of the multiple swept fan blades having:

a tip profile that substantially corresponds to the convergent inner duct wall of the fan casing;

a leading edge that defines a variable sweep angle in a direction perpendicular to the axis of rotation, the leading edge including:

an inner region adjacent the hub, the inner region defining a forward sweep angle;

an intermediate region between the inner region and the fan casing, the intermediate region defining a rearward sweep angle; and

an outer region between the intermediate region and the fan casing, the outer region defining a forward sweep angle.

A fan stage of a ducted fan gas turbine engine, comprising:

a fan casing having an inner duct wall which in a fan rotor region is convergent in the downstream direction; and

a fan rotor including a multiplicity of swept fan blades spaced apart around a hub mounted concentrically with respect to the fan duct, each of said swept fan blades having (i) a tip profile which in revolution substantially corresponds to the convergent duct wall, (ii) a leading edge of variable sweep angle which varies with increasing blade height or distance from the axis of rotation, said sweep angle having a forward sweep angle in a first height region between the root and a first intermediate radius, a rearward sweep angle in an intermediate height region between the first intermediate radius and a second intermediate radius, and a sweep angle in a third height region between the second intermediate radius and the tip of the blade such that said third height region is translated forward, and (iii) a stagger angle which increases progressively with blade height.

A fan stage of a ducted fan gas turbine engine, comprising:

a fan casing having an inner duct wall which in a fan rotor region is convergent in the downstream direction; and

a fan rotor including a multiplicity of swept fan blades spaced apart around a hub mounted concentrically with respect to the fan duct, each of said swept fan blades having (i) a tip profile which in revolution is convergent so as to substantially correspond to the convergent duct wall, (ii) a leading edge of variable sweep angle which varies with increasing blade height or distance from the axis of rotation, said sweep angle having a forward sweep angle in a first height region between the root and a first intermediate radius, a rearward sweep angle in an intermediate height region between the first intermediate radius and a second intermediate radius, and a sweep angle in a third height region between the second intermediate radius and the tip of the blade such that said third height region is translated forward, and (iii) a stagger angle which increases progressively with blade height.

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a fan casing having an inner duct wall which in a fan rotor region is convergent in the downstream direction; and

a fan rotor including a multiplicity of swept fan blades spaced apart around a hub mounted concentrically with respect to the fan duct, each of said swept fan blades having (i) a tip profile which in revolution substantially corresponds to the convergent duct wall, (ii) a leading edge of variable sweep angle which varies with increasing blade height or distance from the axis of rotation, said sweep angle having a forward sweep angle in a first height region between the root and a first intermediate radius, a rearward sweep angle in an intermediate height region between the first intermediate radius and a second intermediate radius, and a forward sweep angle in a third height region between the second intermediate radius and the tip of the blade, and (iii) a stagger angle which increases progressively with blade height.

A fan stage of a ducted fan gas turbine engine, comprising

a fan casing having an inner duct wall which in a fan rotor region is convergent in the downstream direction; and

a fan rotor including a multiplicity of swept fan blades spaced apart around a hub mounted concentrically with respect to the fan duct, each of said swept fan blades having a tip profile which in revolution is convergent so as to substantially correspond to the convergent duct wall, a leading edge of variable sweep angle which varies with increasing blade height or distance from the axis of rotation, said sweep angle having a forward sweep angle in a first height region between the root and a first intermediate radius, a rearward sweep angle in an intermediate height region between the first intermediate radius and a second intermediate radius, a forward sweep angle in a third height region between the second intermediate radius and the tip of the blade, a stagger angle which increases progressively with blade height.

A fan stage of a ducted gas turbine engine that is at least in part rotatable about an axis of rotation and defines a downstream direction along the axis of rotation, comprising:

a fan casing that defines an inner duct wall having a fan rotor region, the inner duct wall of the fan casing at the fan rotor region being convergent;

a hub disposed concentrically relative to the fan casing;

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a tip profile that is convergent so as to substantially correspond to the convergent inner duct wall of the fan casing;

a leading edge that defines a variable sweep angle in a direction perpendicular to the axis of rotation, the leading edge including:

an inner region adjacent the hub, the inner region defining a forward sweep angle;

an intermediate region between the inner region and the fan casing, the intermediate region defining a rearward sweep angle; and

an outer region between the intermediate region and the fan casing, the outer region defining a forward sweep angle.

5. All errors being corrected in the subject reissue application up to the time of filing this declaration, including the error identified above, arose without deceptive intent on our parts.

6. We hereby appoint John Swiatocha, Registration No. 27,955, Kenneth C. Baran, Registration No. 32,682, and David M. Quinlan, Registration No. 26,641, as our attorneys to transact all business in the Patent and Trademark Office.

7. All correspondence in the above-identified application should be sent to:

David M. Quinlan
40 Nassau Street
Princeton, NJ 08542
Telephone: (609) 921-8660
Facsimile: (609) 921-8651

Each of us hereby declares that all statements made herein of our own knowledge are true and that all statements made on information and belief are believed to be true; and further that the statements were made with the knowledge that willful

false statements and the like so made are punishable by fine or imprisonment, or both, under § 1001 of Title XVIII of United States Code, and that such willful false statements may jeopardize the validity of this application or any patent issued thereon.

Date: _____

Dennis N. Kantor
330 Roberts Street
East Hartford, CT 06108
Executor of the Estate of
David A. Spear, deceased,
formerly residing at:
28 Bishop Drive
Manchester, CT 06040

Date: 1/14/02

Bruce P. Biederman

Date: 1/15/02

John A. Orosa

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a fan casing having an inner duct wall which in a fan rotor region is convergent in the downstream direction; and

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